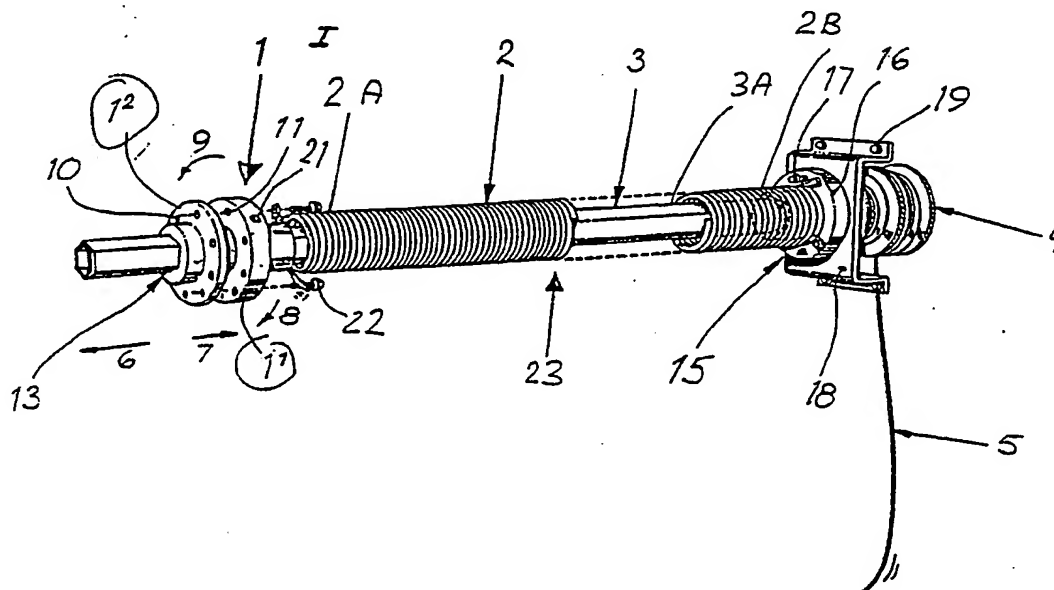


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/SE90/00364 (22) International Filing Date: 30 May 1990 (30.05.90) (30) Priority data: 8901932-7 30 May 1989 (30.05.89) SE (71) Applicant (for all designated States except US): CRAWFORD DOOR AB [SE/SE]; Box 160, S-423 21 Torslanda (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): BENGTSSON, Fred [SE/SE]; Kyrkås Trappor 3, S-433 31 Partille (SE). (74) Agent: AWAPATENT AB; Box 53252, S-400 16 Göteborg (SE).		(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE*, DE (European patent)*, DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US. Published With international search report. With amended claims.	

(54) Title: A SPRING ATTACHMENT MEMBER



(57) Abstract

A spring attachment member (1) for securement of a door balancing spring (2) which is coiled about a shaft (3). In accordance with the invention at least one (2A) of the ends of the spring (2) is arranged to be secured to a two-piece attachment (1) enclosing the spring mounting shaft (3). One attachment member part (1¹) is slidable in the lengthwise direction (6-7) as well as being arranged to turn (8-9) about said shaft (3). The second, complementary attachment member part (1²) is arranged for sliding movement in the lengthwise direction (6-7) of the shaft (3) but is non-rotationally mounted thereon. The two attachment member parts (1¹, 1²) are arranged to be securely interconnected.

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A SPRING ATTACHMENT MEMBER

The present invention concerns a spring attachment member for securement of a door balancing spring which is coiled about a shaft.

5 The main purpose of the present invention is primarily to provide a spring attachment member which is arranged in such a manner as to allow the door balancing torsional spring/springs to be tensioned upon downwards movements (closing) of the door.

10 This purpose is achieved in accordance with the invention with the aid of a spring attachment member which is characterized in that at least one of the ends of the spring is arranged to be secured to a split two-piece spring attachment member enclosing the spring shaft, one attachment member part being slidable in
15 the lengthwise direction of the shaft as well as being arranged to turn about said shaft, and in that the second, complementary attachment member part is arranged for sliding movement in the lengthwise direction of the shaft but is non-rotationally mounted thereon, said
20 two attachment member parts arranged to be securely interconnected.

One preferred embodiment of the invention will be described in closer detail in the following with reference to the accompanying drawings, wherein

25 Fig. 1 shows a spring attachment member and the associated spring in a disconnected, pre-assembly position.

Fig. 2 illustrates the spring attachment member in the tightened assembly position, and

30 Fig. 3 illustrates the attachment member in its fully mounted position, the alternative displaced position of the attachment member being shown in broken lines.

The subject invention concerns a spring attachment

member 1 for a door balancing spring 2 which is coiled about its associated door spring shaft 3, one end 3A of said spring being non-rotationally secured to a cable drum 4 on which drum 4 is wound a cable 5 which is attached to a door. The door is guided for movement along tracks extending alongside the opening to be closed by the door.

In accordance with the teachings of the invention one end 2A of the spring 2 which preferably is of the helically wound type, is arranged to be attached to a split, two-piece spring attachment member 1 which encloses the spring shaft 3. One attachment member part 1¹ of the attachment member 1, which part is intended to be attached to the spring 2 and to be positioned next to said spring, is mounted on the shaft 3 in such a manner as to be displaceable along said shaft 3 in the directions indicated by arrows 6, 7. In addition, this attachment member part 1¹ is mounted for rotational movement about the shaft 3 in the direction indicated by arrows 8-9.

The second complementary attachment part 1² of the two-piece attachment member 1 is mounted on the shaft 3 for movement in the longitudinal directions thereof indicated by arrows 6-7. However, this second attachment member part 1² is non-rotationally attached to the shaft 3 and consequently these two components turn together as one single unit.

In accordance with the teachings of the invention the two attachment member parts are interconnectable, for example by means of non-threaded through-holes 10 formed in e.g. the second attachment member part 1² and threaded holes 11 formed in the other attachment member part 1¹, and by means of threaded attachment bolts 12 arranged to be received in the respective holes 10, 11 so as to form an integrated spring attachment member 1 which is non-rotationally secured to the spring shaft 3 but displaceable in the longitudinal directions

6-7 of the shaft 3.

Preferably, the two attachment member parts 1^1 , 1^2 are disc-shaped, presenting e.g. a circular circumferential configuration, with the first attachment member part 1^1 having a circular central opening to allow free rotational movement of said attachment part in coupling position I around the spring shaft 3 whereas the second attachment member part 1^2 has a central opening 13 of irregular configuration in order to be turned together with and by said spring shaft 3. Preferably, the central opening 13 of said second attachment member part 1^2 has a circumferential configuration which essentially matches the shape of the spring shaft 3. The spring shaft 3 may for instance have a non-round configuration or a polygonal circumferential configuration, such as a hexagonal shape, in which case the central opening 13 has a configuration matching that of the spring shaft 3, i.e. the central opening 13 has a congruent hexagonal configuration.

The hub portion 14 of the first attachment member part 1^1 is arranged to receive a bearing means of complementary configuration projecting in axial direction from the second attachment member part 1^2 .

The second end 2B of the spring 2 may be attached to a similar attachment member to that described in the foregoing or to a conventional attachment member 15, for instance of the kind illustrated in the drawing figures and comprising a disc-shaped attachment member part 16 to which the spring 2 is secured by means of a screw 17 and which attachment part 16 is arranged for securement in a wall-mounted bracket 18 which by means of screws 19 is fastened to the intended mounting place.

Attachment member part 1^1 of the intended two-piece spring attachment member 1 is formed with reception means 21 designed in conformity with a manually actuatable turning element 20. The reception means may be e.g.

~~...a number of apertures 21 adapted to receive one end 20A~~
of a lever 20. Preferably, a plurality of lever receiving apertures 21 are distributed along the circumference of the associated attachment member part 1¹.

5 Finally, the spring 2 is secured to the attachment member part 1¹ by means of a bolt joint 22.

How the spring attachment member in accordance with the invention functions should be apparent from the foregoing and from a study of the drawings. Briefly,
10 the entire spring unit 23 is lifted as one single piece to the intended position of use to be secured in that position by means of screws. At this stage the spring 2 is in its untensioned, unloaded coupling position I, in which its one spring end 2A is attached to the attachment member part 1¹.
15 By means of the lever 20 said attachment member part 1¹ is turned in the rotational direction 9 to tension the spring 2 in such a manner that the latter obtains the correct desired spring tension, whereupon the attachment member part 1¹ and the second attachment part 1² are jointed together by means of screws,
20 said second attachment member part being rotated together with the spring mounting shaft 3 which is interconnected with the wire drum 4. Consequently, the spring 2 need not be tightened before the door hoisting cable 5 is
25 secured to the door in its intended position.

In the interconnected position II of the attachment member 1 the latter is freely displaceable in the horizontal directions 6-7 in dependence on the amount of extension and contraction, respectively, of the spring 2
30 in the various setting positions thereof.

The invention is not limited to the embodiments described in the foregoing and illustrated in the drawings but various modifications are possible within the scope of the appended claims.

CLAIMS

1. A spring attachment member (1) for securing a door balancing spring (2) which is coiled about a shaft (3), characterized in that at least one (2A) of the ends of the spring (2) is arranged to be secured to a split, two-piece spring attachment member (1) enclosing the spring shaft (3), one attachment member part (1¹) being slidable in the lengthwise direction (6-7) of the shaft as well as being arranged to turn (8-9) about said shaft (3), and in that the second, complementary attachment member part (1²) is arranged for sliding movement in the lengthwise direction (6-7) of the shaft (3) but is non-rotationally mounted thereon, said two attachment member parts (1¹, 1²) arranged to be securely interconnected.

2. A spring attachment member as claimed in claim 1, characterized in that the attachment member parts (1¹, 1²) are disc-shaped, one (1¹) of said attachment member parts having a circular hub opening whereas the second attachment member part (1²) is formed with a central opening (13) of irregular configuration.

3. A spring attachment member as claimed in claim 2, wherein said spring shaft (3) has a polygonal peripheral configuration, e.g. a hexagonal configuration, characterized in that the central opening (13) of said second attachment member part (1²) has a peripheral configuration matching that of the spring shaft (3).

4. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the central portion (14) of said first attachment member part (1¹) is arranged to be fitted onto a bearing means of complementary configuration projecting in the axial direction (7) from said second attachment member part (1²).

5. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the two attachment member parts (1¹, 1²) are formed respectively with a through-hole (10) and with a threaded hole (11) for reception in said holes of attachment bolts (12) serving to join the two attachment member parts (1¹, 1²) together for the purpose of forming an attachment member (1) which is non-rotationally secured to the spring shaft (3) but may be displaced in the longitudinal direction (6, 7) of said shaft.

6. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the first attachment member part (1¹) is formed with reception means (21) designed in conformity with a manually actuatable turning element (20), said reception means (21) being e.g. a number of apertures (21) adapted for reception therein of a lever (20).

7. A spring attachment member as claimed in claim 6, characterized in that a plurality of lever reception apertures (21) are distributed along the circumference of the first attachment member part (1¹).

8. A spring attachment member as claimed in any one of the preceding claims, characterized therein that a bolt joint (22) secures the spring (2) to the first attachment member part (1¹).

AMENDED CLAIMS

[received by the International Bureau
on 19 October 1990 (19.10.90);
original claim 1 amended; other claims unchanged
(2 pages)]

1. A spring attachment member (1) for securing
a door balancing spring (2) of the helically wound type
through which passes a shaft (3), said spring attach-
ment member arranged to non-rotationally secure one
5 spring end to said shaft, c h a r a c t e r i z e d
in that it comprises two releasably interconnected
parts, one part (1¹) of which is rotational relative
to the shaft but non-rotational relative to said spring
end whereas the second part (1²) which is interconnectable
10 with the first part, is non-rotationally but at the
same time slidably mounted on the shaft (3) in such
a manner that the end attachment (1), in its assembled
condition, is free to move axially, also under conditions
of spring (2) activity, while being guided by said shaft,
15 whereas the attachment member part attached to the spring,
when disconnected from the other part, may be turned
relative to the shaft and bring along said spring end
in its turning movement until attainment of the desired
spring tension relative to said shaft, whereupon it
20 is locked in that position by mutual interconnection
of that two spring attachment member parts.

2. A spring attachment member as claimed in claim
1, c h a r a c t e r i z e d in that the attachment
member parts (1¹, 1²) are disc-shaped, one (1¹) of said
25 attachment member parts having a circular hub opening
whereas the second attachment member part (1²) is formed
with a central opening (13) of irregular configuration.

3. A spring attachment member as claimed in claim 2,
wherein said spring shaft (3) has a polygonal peripheral
30 configuration, e.g. a hexagonal configuration, c h a -
r a c t e r i z e d in that the central opening (13)
of said second attachment member part (1²) has a peri-
pheral configuration matching that of the spring shaft (3).

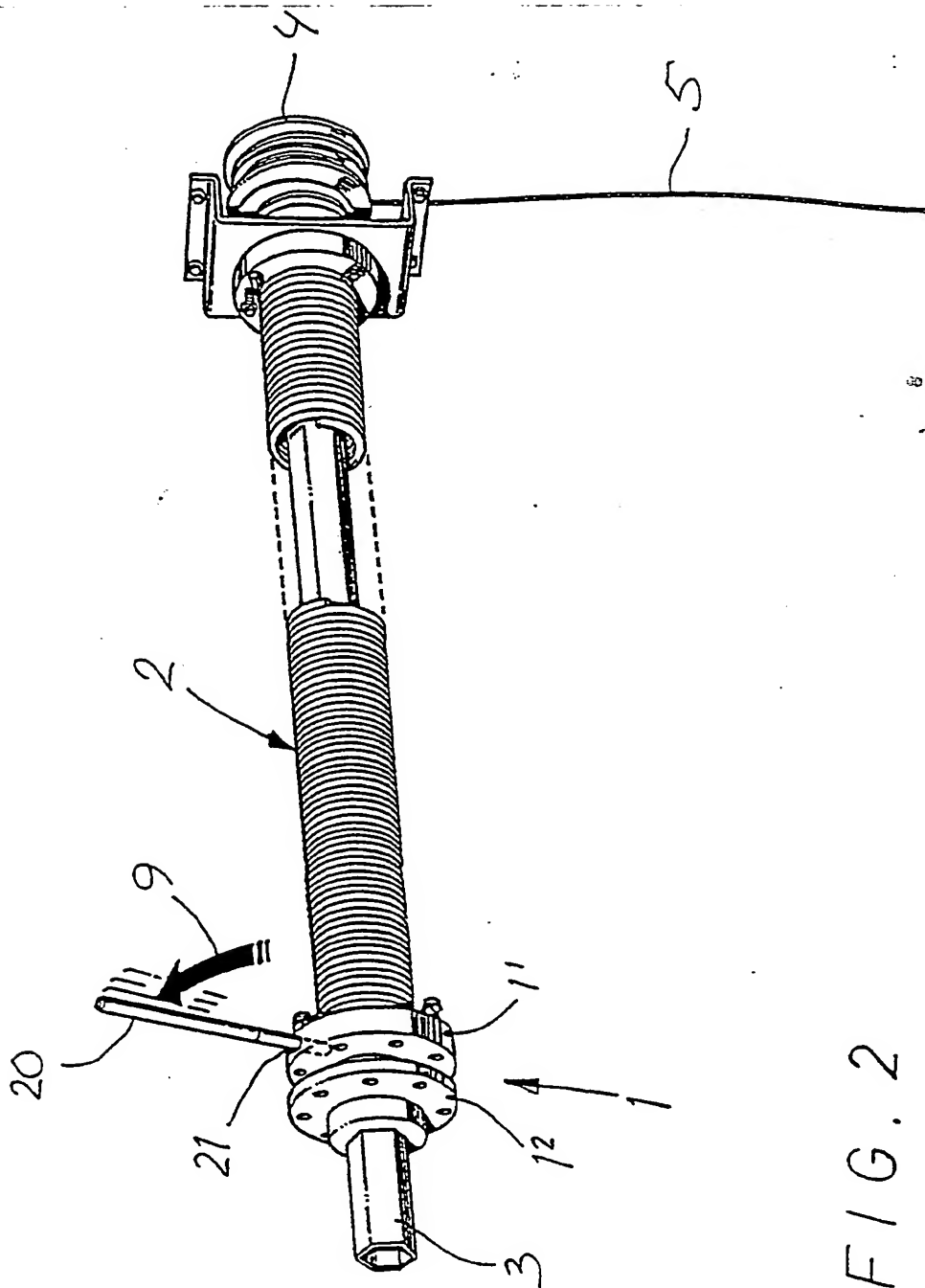
4. A spring attachment member as claimed in any one of the preceding claims, characterized therein that the central portion (14) of said first attachment member part (1¹) is arranged to be fitted
5 onto a bearing means of complementary configuration projecting in the axial direction (7) from said second attachment member part (1²).

5. A spring attachment member as claimed in any one of the preceding claims, characterized
10 therein that the two attachment member parts (1¹, 1²) are formed respectively with a through-hole (10) and with a threaded hole (11) for reception in said holes of attachment bolts (12) serving to join the two attachment member parts (1¹, 1²) together for the purpose
15 of forming an attachment member (1) which is non-rotationally secured to the spring shaft (3) but may be displaced in the longitudinal direction (6, 7) of said shaft.

6. A spring attachment member as claimed in any
20 one of the preceding claims, characterized therein that the first attachment member part (1¹) is formed with reception means (21) designed in conformity with a manually actuatable turning element (20), said reception means (21) being e.g. a number of apertures
25 (21) adapted for reception therein of a lever (20).

7. A spring attachment member as claimed in claim 6, characterized in that a plurality of lever reception apertures (21) are distributed along the circumference of the first attachment member part (1¹).

30 8. A spring attachment member as claimed in any one of the preceding claims, characterized therein that a bolt joint (22) secures the spring (2) to the first attachment member part (1¹).



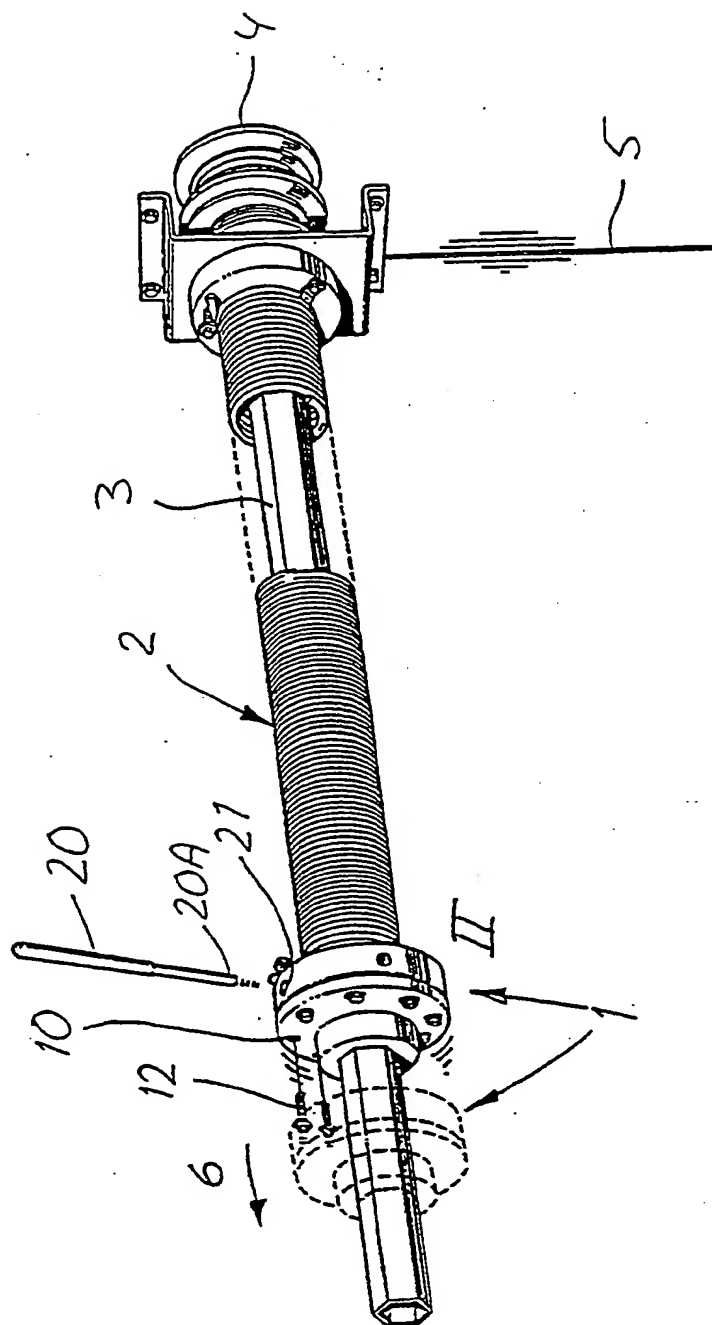


FIG. 3

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 90/00364

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: E 05 D 13/00, E 05 F 1/08																							
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-bottom: 1px solid black;">Classification System</td> <td style="border-bottom: 1px solid black;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">IPC5</td> <td style="padding: 5px;">E 05 D; E 05 F</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸</div> <p style="padding: 5px;">SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	E 05 D; E 05 F																	
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IPC5	E 05 D; E 05 F																						
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="width: 60%; border-bottom: 1px solid black;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 30%; border-bottom: 1px solid black;">Relevant to Claim No.¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 1922370 (C.G. JOHNSON ET AL) 15 August 1933, see the whole document</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,5-8</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="text-align: center; vertical-align: top; padding: 5px;">--</td> <td style="text-align: center; vertical-align: top; padding: 5px;">2-5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">SE, C, 186196 (E A FORS ET AL) 12 November 1963, see the whole document</td> <td style="text-align: center; vertical-align: top; padding: 5px;">2-5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 3635277 (BAHNSEN) 18 January 1972, see the whole document</td> <td style="text-align: center; vertical-align: top; padding: 5px;">2-5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 2097242 (D.M. ROBINSON) 26 October 1937, see the whole document</td> <td style="text-align: center; vertical-align: top; padding: 5px;">2-5</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 5px;">-----</td> <td></td> </tr> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	US, A, 1922370 (C.G. JOHNSON ET AL) 15 August 1933, see the whole document	1,5-8	Y	--	2-5	Y	SE, C, 186196 (E A FORS ET AL) 12 November 1963, see the whole document	2-5	Y	US, A, 3635277 (BAHNSEN) 18 January 1972, see the whole document	2-5	Y	US, A, 2097242 (D.M. ROBINSON) 26 October 1937, see the whole document	2-5		-----	
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																							
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="padding: 5px;">6th August 1990</td> <td style="text-align: center; padding: 5px;">1990 -08- 24</td> </tr> <tr> <td style="border-bottom: 1px solid black;">International Searching Authority</td> <td style="border-bottom: 1px solid black;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center; padding: 5px;">SWEDISH PATENT OFFICE</td> <td style="text-align: center; padding: 5px;"> Christer Wendelius </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	6th August 1990	1990 -08- 24	International Searching Authority	Signature of Authorized Officer	SWEDISH PATENT OFFICE	 Christer Wendelius													
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SWEDISH PATENT OFFICE	 Christer Wendelius																						

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 90/00364

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 90-06-27. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 1922370	33-08-15	NONE	
SE- - 186196	63-11-12	NONE	
US-A- 3635277	72-01-18	NONE	
US-A- 2097242	37-10-26	NONE	

INTERNATIONAL SEARCH REPORT

International Classification No

PCT/EP 03/03132

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E05D13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 1 922 370 A (BLODGETT HERBERT C ET AL) 15 August 1933 (1933-08-15) page 1, line 100 -page 2, line 32; figures 1,4	1-3,8-10 4-7
X	US 2 116 329 A (STURMAN ROBERT E) 3 May 1938 (1938-05-03) column 2, line 12 - line 48; figures 1-3	1-3,8-10
X	WO 90 15216 A (CRAWFORD DOOR AB) 13 December 1990 (1990-12-13) page 2, line 8 -page 4, line 30; figures	1-3,8-10

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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& document member of the same patent family

Date of the actual completion of the international search

10 June 2003

Date of mailing of the international search report

20/06/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
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Fax (+31-70) 340-3016

Authorized officer

D1 Renzo, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Publication No

PCT/EP 03/03132

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1922370	A	15-08-1933	NONE
US 2116329	A	03-05-1938	NONE
WO 9015216	A	13-12-1990	SE 464821 B 17-06-1991
		AU 5825090 A 07-01-1991	
		SE 8901932 A 01-12-1990	
		WO 9015216 A1 13-12-1990	